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SECRETTID/TAB-62/63
5 August 1963*reduction***MEMORANDUM FOR THE RECORD****SUBJECT: Changes in Camera Calibration Data**

1. There have been three camera calibration reports issued, with three different orientation matrices by ACIC. The following is the case history:

- a. The first camera calibration data was published 28 March 1963.
- b. On 17 April 1963 (TAB/memo 44/63) a meeting was held whereat [REDACTED] a note to correct the matrix published on 28 March 1963.
- c. The correction given to [REDACTED] was entered into the 28 March camera calibration publication and forwarded to [REDACTED] on 24 April 1963. NOTE: The stellar reductions done on contract for NPIC by [REDACTED] for Mission 9053 used the corrected matrix given to [REDACTED] on 17 April 1963.
- d. On 10 June 1963 the pitch, roll and yaw for Mission 9053 was received from [REDACTED].
- e. On 11 June 1963 another calibration report with still another matrix correction was received at NPIC, with the statement that it superseded all previous camera calibration data for the same Mission.

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2. [REDACTED] has been asked to rerun Mission 9053 using the last transformation matrix.

DECLASS REVIEW by NIMA/DOD**SIGNED**

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Distribution:

- Orig - Chief, TID
- 1 - Asst for P&D
- 2 - Chief, TID/TAB
- 1 - TID/TAB (File)

SECRET

GROUP 1
Excluded from automatic
downgrading and
declassification

SPECIFICATIONS FOR A PATIO CALIBRATION
OBSERVATION FOR A SPECIAL CAMERA SYSTEM

The following procedures for obtaining the relative orientation between two camera systems using stellar photography are hereby proposed as a general outline of methods, equipment and material. The provisions set forth are intended to utilize as much as possible the equipment and procedures currently used in the patio routine. Departures from this routine, as outlined below, are necessary to provide the interior orientation constants customarily furnished with the lens calibration report. Finally, it is understood that some of the procedures herein described may not be followed for considerations not presently envisioned.

Auxiliary Equipment:

- (1) Time recorded with a permanent record, if available, or a precision time piece. (differential refraction requirements impose an absolute time accuracy of <10 sec time, therefore ± 1 second least readings more than satisfy this requirement)
- (2) 2.5, 5, 10, 15 mc receiver.
- (3) Remote exposure control .
- (4) Vacuum pump and accessories.
- (5) Hygro-thermograph
- (6) Barometer

Film:

In order to realize the maximum stellar record for calibration purposes it is recommended that the operational type emulsion be replaced with EK Tri-X or an equivalent.

- (1) Stellar, approx. 15 feet, 35 mm roll, Tri-X or equivalent
- (2) Terrestrial, approx. 30 feet, 70 mm roll, Tri-X or equivalent

Special Provisions:

- (1) Fiducials: Provision shall be made for adjusting fiducial illumination on both formats in order to achieve an optimum fiducial exposure for faster emulsions. If the fiducial system consists of a background light impressed réseau this consideration is obviated.
- (2) Baffling: Baffling for solar flare and earth reflection shall be operationally mounted for the test.
- (3) Lens apertures shall be set at operational levels for the test.
- (4) Shutter speeds shall be set for equal and concurrent times for both cameras and shall be automatically controlled by a remote exposure control. The pulse range shall be taken between 1 and 60 seconds. Shutter control interrogation shall be manually controlled by the operator-observer.

Observing conditions:

- (1) Cloud or haze cover shall not be sufficiently prevalent to continually hazard an obscuration of any part of either format. Exposures known to have been partly obscured should be repeated until a minimum required number of cloud free exposures have been obtained.
- (2) Atmospheric clarity shall be such that 5th magnitude stars are visible to the unaided eye.
- (3) Photography shall be suspended for times when the moon apparently approaches within 15° of either format.

Record:

- (1) Instrument serial number
- (2) Date of test
- (3) WWV referenced time entries on timer output
- (4) Cycle number and corresponding time registration of each exposure
- (5) Chronological history of the test according to schedule
- (6) Barometer, hourly recordings (0^h 01) *Hz*.
- (7) Temperature (0° C), and humidity

- (8) Estimated cloud cover and general visibility
- (9) Malfunctions and unusual occurrences
- (10) Geographic position of the observation platform
($\pm 1'$ latitude, $\pm 1'$ longitude)

Procedure:

- (1) Interior orientation: The instrument shall have the provision for alternately orienting the cameras such that:
 - (a) The terrain camera is directed toward the zenith and leveled to approximately one minute of arc.
 - (b) The stellar camera is similarly oriented and leveled.
- (2) About ten cycles shall be exposed for each camera at the zenith position. It will be necessary to determine the optimum exposure times from the first patio calibration. It is estimated that using the operational emulsion that a maximum of 10 seconds will be acceptable from a standpoint of image motion. Tri-X or an equivalent may require 10 seconds or less depending upon the amount of background fogging.
- (3) Relative orientation: The instrument shall have a provision such that the plane defined by the camera optical axes may be oriented generally along the meridian with the stellar camera axis elevated approximately 25° above the south horizon.
- (4) Approximately ten cycles of simultaneous exposures shall be made in the configuration for relative orientation with synchronized opening and closing of the two camera shutters.
- (5) An identifying exposure of 30 seconds duration shall be made at the beginning and end of each sequence (e. g., 10 stellar zenith exposures).
- (6) Four cycles shall be run between each major event (i. e. between identifying trail exposures) with lenses covered in order to permit a non-destructive film cut.